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A-GRAM

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# On-Site Chlorine Generation for Drinking Water and Wastewater Disinfection

## Synopsis

The use of on-site chlorine generators is becoming a viable option for disinfecting drinking water and wastewater. Chlorine generators work by using electricity to convert ordinary table salt—sodium chloride (NaCl)—into sodium hypochlorite (hypochlorous acid). Switching from gas chlorination or purchased sodium hypochlorite to chlorine generators can reduce hazards to workers from leaks and handling hazardous material. It can also reduce operating costs.

While some generators are marketed as producing "mixed oxidants"—which may include a mixture of sodium hypochlorite, chlorine, chlorine dioxide, hydrogen peroxide, ozone, and/or hydroxyl radicals—these generators may not be any more effective at disinfection than standard sodium hypochlorite generators. Most of these systems are designed to produce sodium hypochlorite at concentrations of less than 1%. Although this prevents the product from being classified as a hazardous material, larger storage tanks are needed than if a 12% sodium hypochlorite solution is purchased.

## System Design Considerations

Adequate space in existing facilities may be limited for installation of the chlorine generator equipment, which includes a salt storage area, salt feed tank, sodium hypochlorite storage tank, chemical metering pump equipment, and piping and valves. Since chlorine generators can fail, a back-up source of disinfection chemicals is needed. This can be a second chlorine generator or purchased drums of sodium hypochlorite and appropriate feed equipment.

## Capital and Operational Cost Evaluations

For new construction, the equipment purchase costs for on-site chlorine generation systems will be higher than the relatively simple hypochlorite chemical feed system and most gas chlorination systems. However, lower operating costs might offset the higher initial costs or the retrofit costs for existing construction.

When comparing systems—whether for new or retrofit applications—the total operational costs must include chemical purchases, electrical consumption, recurring maintenance, and technician labor. Contact the AFCESA POC to obtain general capital and annual operation and maintenance costs for new and retrofit installations at typical small, medium and large bases. Cost models are available to help estimate savings in a given situation.

Prior to selecting any disinfection system, a precise capital and operational cost evaluation should be completed. The minimum considerations are each particular installation's construction or retrofit costs; system flow rate; production periods; required chemical dosage; bulk chemical costs; electrical rate schedule; and maintenance technician arrangements.

## Swimming Pools

There are also lower-cost chlorine generators designed especially for swimming pool applications. These generators might be more cost-effective than purchased chlorine.

## Conclusion

Newer technologies, such as on-site chlorine generator systems, provide the Air Force with opportunities to reduce risk to workers, base personnel, and the environment. Each installation should consider whether this technology could offer a cost-effective solution in disinfecting our water and wastewater while protecting our valuable resources.

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